Science

SERVES YOUR FARM

Bulletin 393, Part 3

Spring 1957

EST VIRGINIA UNIVERSITY AGRICULTURAL EXPERIMENT STATION

Bulletin 393, Part 3 Spring, 1957

Science SERVES YOUR FARM

Annual Report of H. R. Varney, Director West Virginia University Agricultural Experiment Station For the Period 1955-56

Annual Report, Parts Published Quarterly by AGRICULTURAL EXPERIMENT STATION West Virginia University Morgantown, W. Va.

Director H. R. Varney

Editor ..... John Luchok
Assistant Editor ..... Glenn D. Bengtson
Photographer ..... David R. Creel

Publications Committee: V. G. Lilly, W. W. Armentrout, J. A. Welch. Science Serves Your Farm will be sent free to any resident of West Virginia in response to a written request to the Director, Agricultural Experiment Station, West Virginia University, Morgantown, W. Va.

IN THIS ISSUE

WILDLIFE PLANTINGS 3
CHEMICAL WEED CONTROL FOR YOUNG ORCHARDS 4
NUTGRASS PROBLEM? 5
IRRIGATION 6
MICROBE HELPERS IN THE SOIL 8
CROSSBREEDING MAY LEAD TO BETTER LAYERS 9
CURRANTS 11
WVU DAIRY HERDS ARE CHAMPION PRODUCERS 12

on the calendar . . .

July—
1-2—W. Va. Sheep Breeder's Association annual meeting, Purebred Show and Sale, Petersburg
10—State 4-H Dairy Cattle Judging Contest, Morgantown
11—Agronomy Field Day, Ohio Valley Substation, Pt. Pleasant
19—FFA State Land Judging Contest, Jackson's Mill
19-22—State FFA Convention, Jackson's Mill
31-Aug 2—W. Va. Poultry Convention, Moorefield

August—
12-16—W. Va. Dairy Cattle Show, Jackson's Mill
19-24—W. Va. State Fair, Lewisburg

on our cover

The sheep industry is moving east! Numbers are declining in the western part of the nation, and the size and number of flocks in the eastern states are steadily growing. This means that the supply of replacement ewes shipped in from the West is not going to be so plentiful. Yet, the demand for good ewes in the East will be expanding.

The production of replacement ewes, market lambs, and wool has received much emphasis in the research program of the West Virginia University Agricultural Experiment Station. Ten years of research comparing Native Hampshire type ewes with Western Corriedale type ewes has been reported in Bulletin 398, just released.

Another important bit of sheep research was reported to livestock producers attending the WVU Livestock Field Day at Reymann Memorial Farms on June 11. Field Day visitors saw replacement ewes and lambs produced by crossing Western black-faced ewes with Corriedale, Hampshire, and Dorset rams. Animal husbandmen are now evaluating these replacement ewes as to their lamb and wool producing ability.

Seeing for yourself is one of the best ways to get the most out of the research being conducted by the Experiment Station at its experimental farms and substations. On July 11, an Agronomy Field Day will be held at the Ohio Valley Substation at Pt. Pleasant. Plan to attend.

new publications

Bulletins

382. Part 3. Annual Report of H. R. Varney, Director. Science Serves Your Farm. Spring 1956.
392. Collins Veatch. Winter Barley Variety Trials in West Virginia. 1949-1955. August 1956.
393. Parts 1 & 2. Annual Report of H. R. Varney, Director. Science Serves Your Farm. Fall-Winter 1956-57.
394. Roger W. Pease. Some Effects of Location on West Virginia Nursery Marketing Ornamental Plants. February 1957.
395. R. V. Ackerman, I. D. Porterfield, H. O. Henderson, J. F. Fike, D. Munro. The Response of Dairy Calves to Rumen Inoculation and Various Feeding Methods. March 1957.
396. Homer C. Evans, Ray S. Marsh. Apple Color—Its Development and Sales Appeal. March 1957.
397. George Loben. What the Farming Situation is Like in Northeastern West Virginia. April 1957.

(continued on page 11)

Wildlife plantings

by Maurice Brooks, Forester

There is a wide choice of native shrubs, woody vines, and other plants which will add beauty to the home grounds and provide winter food and shelter for our wildlife friends.

THE principal function of any wildlife planting is to furnish food and cover for wild animals throughout the year. Such plantings may also stabilize soil to prevent erosion, provide ornament for farm and home, and provide food for mankind.

Wildlife plantings are of two different types—extensive plantings in which hundreds or thousands of plants are used, and intensive plantings around the home, school, or other buildings. In the first type, plantings are made under field conditions, and individual seedlings will not receive as much care as those in intensive plantings. For this reason, species must be selected which will survive under competition of grass, weeds, and other woody plants. For home plantings, in which relatively few specimen trees or shrubs will be used, a much wider choice of plant materials is available, since each plant will receive greater care.

All types of plant life—trees, shrubs, and herbs—furnish food and shelter to wildlife, but this article will be concerned primarily with shrubs and small trees which have proved their value in West Virginia. Some are native and some are introduced, but all will grow under average conditions in the State.

What is Available?

The first principle in starting a wildlife planting is to begin with whatever of value is already available. West Virginia has a wealth of shrubs and woody vines, almost every one of which is helpful to game and other wildlife species. On some areas, food will be abundant throughout the year. In such situations the greatest need in planting may be to provide winter cover by means of brushy fencerows, living fences, and spot plantings of coniferous and broad-leaved evergreens. In other situations, where food may be abundant at certain seasons but short during critical winter and early-spring months, supplementary plantings of food-bearing plants will be desirable.

An ideal mixture of food-producing native shrubs and woody vines in West Virginia might contain serviceberry, red-and-black-fruited elders, fire cherry, mulberry, blackberry, black cherry, and various species of viburnums, wild grapes, flowering dogwood, sassafras, hazelnuts, chinquapin, scrub oak, poison ivy, evergreen and deciduous hollies, mountain ash, and species of sumac. Such a mixture would offer nuts and fruits at every season of the year.

(continued on page 10)

Multiflora rose planted on the contour provides a game run between the wildlife habitats, serves as a living cattle-tight fence, and is an effective soil conservation measure.

A woodland border of multiflora is good wildlife management practice. Such a planting provides food and shelter for birds and game, adds beauty and value to farm lands.

Chemical Weed Control

is it practical for young orchards?

Oscar E. Schubert and Vincent A. Amato[1]

ARE herbicides practical for controlling weeds around young peach trees and apple trees? Test applications of five herbicides at the West Virginia University Horticulture Farm at Morgantown indicate that these chemicals may become valuable tools for the orchardist, but they must be selected and used with care in order to avoid injury to sensitive trees.

The project was initiated in 1956 to determine which herbicides could be used without injury to the young trees, whether established weeds could be controlled by this method, symptoms of injury, if any, to the young trees, weeds that are killed or severely injured by the chemicals, as well as weeds that turn out to be relatively resistant to the herbicides.

The herbicides* used were Dalapon, Monuron, CIPC, Amino Triazole, and maleic hydrazide. Dalapon was applied in six concentrations, each being applied to two young apple trees and a young peach tree. The other herbicides were applied in two concentrations, each to two young peach trees and two young apple trees.

1/1000 Acre Plots

The plots to which the herbicides were applied, with the young trees in the center, were 1/1000 acre in area. A wooden frame, easily moved from one tree to the next, outlined the area of the plot. The weed population within each plot was recorded as to species and number before the treatments were made, in order to determine the degree of weed control accomplished by the chemicals.

The herbicides were applied with a sprinkling can, which had been modified by lengthening the spout and replacing the original rose with one having smaller holes. The herbicide for each application was mixed in this can. The amount of concentrated "stock" solution necessary to give the desired rate per acre was placed in the can, and the can filled with water. After a thorough mixing, the solution was applied as evenly over the plot as possible.

The first applications were made on July 14 and 15, 1956. A second application was made on August 21 and 23, to one apple and one peach tree in each of the treatments. The Dalapon treatment on the peach trees was not repeated.

Dalapon Tested

Dalapon (*sodium salt of 2,2-dichloropropionic acid*), when applied at 2.5, 5, 10, 20, 40, and 60 pounds per acre, decreased weed growth by 5, 20, 30, 40, 60, and 50 per cent respectively. When repeated around the apple trees, the above concentrations reduced weed growth by 10, 50, 60, 75, 90, and 85 per cent respectively. The 5-, 10-, and 20-pound applications, where repeated, reduced weed growth more than their equivalent single applications of 10, 20, and 40 pounds respectively. Broad- and narrow-leaved plantains were resistant to all rates.

No injury was observed on any of the apple trees in the Dalapon treatment. The first abnormal symptoms on peach trees appeared in the form of red leaf margins at the 5- and 10-pound rates. At 20, 40, and 60 pounds, the amount of red increased along the margins and sometimes occurred within the margins.

The leaves of those peach trees that received 10 pounds of Dalapon showed a slight amount of necrosis along the margins. At 60 pounds this dead tissue extended inward at least an eighth of an inch. Leaf drop, a more serious symptom, was observed in all peach trees receiving Dalapon. On October 8, leaf drop for each concentration was estimated to be 5, 20, 25, 30, 85, and 100 per cent respectively.

Peach Leaf Injury

Monuron (*3-p-chlorophenyl-1,1-dimethylurea*), applied at rates of 4 and 8 pounds per acre, was effective in killing most of the weeds, with the exception of broad- and narrow-leaved plantains. The soil was nearly free of weeds in all plots, with the exception of where 4-pound applications were made. Here weed growth was about 15 to 20 per cent of that in adjacent check areas.

No injury was observed on the apple trees receiving this treatment

FIGURE 1. Leaves taken in late September from peach trees on plots treated with Monuron. The first symptom of injury (A) appeared as a yellowing of the leaf margin. More serious injury left only the veins and midrib green (B). Severe cases, such as the repeated 8-pound application (C), found the leaf edge dying and curling up. In many cases, only the terminal leaves remained on the shoots. Munuron, 3-p-chorophenyl-1,1-dimethylurea, is also known as CMU.

[1]Respectively, Associate Horticulturist, and former Assistant Extension Horticulturist.

*Acknowledgement is made to the Dow Chemical Company for supplying the Dalapon and Dow General used in this study and to the American Cyanamid Company for the Amino Triazole.

but peach trees were severely injured at both concentrations and with both single and repeat applications. The first symptom of injury was a yellowing of the leaf margins (Figure 1). In time, more and more of the leaf became yellow, until only the tissues around the larger veins and midrib remained green or yellowish-green. Then the leaf margins died to a depth of perhaps one-quarter inch, became brown, and curled upward. On many of the shoots only the terminal one to five leaves remained, giving the shoots a "mule-tailed" appearance.

Amino triazole *(3-amino-1,2,4-triazole)*, applied at rates of 4 and 8 pounds per acre, reduced weeds about 10 to 30 per cent, while the repeat applications reduced weed growth to about 40 to 70 per cent.

CIPC *(isopropyl-N-3-chlorophenyl carbomate)*, applied at 8 and 16 pounds per acre, had little effect on weed growth. Maleic hydrazide, at 5 and 10 pounds per acre, also failed to reduce weed growth.

The applications of amino triazole, CIPC, or maleic hydrazide apparently caused no injury to the peach or apple trees.

Emulsion Spray Tested

In July, 1956, a row of apple and peach trees, not included in the above treatments, was treated with an emulsion of 2 pints of dinitro (Dow General), 3 quarts of CIPC, 5 gallons of fuel oil, and 45 gallons of water. This mixture was applied by a power weed sprayer at the rate of 50 gallons per acre to the weeds growing under the trees. Weed growth was reduced in the sprayed area about 50 per cent. It is usually recommended that this type of spray application be made early, just following cultivation. Weed control in this particular trial would probably have been more effective if this application had been made earlier.

A complete list of commercial herbicides, giving their common or trade names and their chemical names, can be found in Circular 101, "Weed Control—1957 Suggestions."

Further Testing Necessary

This 1956 weed-control trial would indicate that Dalapon, Monuron, and Amino Triazole are effective in killing or greatly reducing weed growth when used at higher rates of application; that Dalapon and Monuron are too phytotoxic for use around peach trees in this area; and that none of the herbicides used in the trial caused a visible amount of injury to apple trees during this particular season.

The weed-control trials will be repeated again this year so as to give further information as to the tolerance of the trees to herbicides. It will not be possible for the Experiment Station to make recommendations for chemical weed control around young fruit trees until this portion of the project has been completed.

Nutgrass problem?

Tests with dinitro look promising

by Collins Veatch
Associate Agronomist

NORTHERN or yellow nut grass *(Cyperus esculentus)* is a perennial sedge that reproduces by seeds and tubers. It is very persistent where found in sandy, wet soils.

A great deal of time and effort is required to control this weed where it is well established in cultivated crops. It can be controlled by cultivation when weather permits.

The chemical control of nut grass has usually been attempted by the use of high application rates of such chemicals as TCA *(sodium trichloroacetate)*, Dalapon *(sodium 2,2-dichloropropionate)*, or sodium chlorate. All of these are expensive and their use takes the treated area out of production, at least temporarily, for annual crops.

Dinitro Tested

Some recent results in Experiment Station trials at Point Pleasant and Wardensville indicate that nut grass in corn can be easily and economically controlled by spraying with dinitro *(alkonolamine salt of dinitro-sec-butylphenol)*.

In the summer of 1955, corn plots at the Ohio Valley Substation near Point Pleasant, were given a post-emergence spray with dinitro. The nut grass on these plots was killed and did not regrow that season. The dinitro spray was applied at a rate of 4 pounds of active ingredient (1.33 gallons of Premerge or Simnox P.E.) per acre in about 35 gallons of water. Drop pipes were used to give a directed spray which contacted the corn only at the base of the stalk. The corn was about 2 feet high.

Drop pipes are essential in using this chemical with corn, because dinitro will burn or kill the corn leaves if it comes in direct contact with them.

More extensive trials with corn were conducted at the Reymann Memorial Farms near Wardensville in 1956. These weed-control trials were started out with pre-emergence applications of the following chemicals: dinitro, 2,4-D; Randox, 3Y9; Emid, and other experimental compounds.

Not one of these pre-emergence applications gave any appreciable control of nut grass. The nut grass infested these plots so thoroughly that the pre-emergence experiments were abandoned.

Post-emergence Successful

Post-emergence applications were then made when the corn was about 2 feet high. Dinitro was applied at a rate of about 4 pounds per acre, using 35 gallons of water under a pressure of 20 pounds per square inch.

These results were so encouraging that the farm superintendent proceeded to spray the rest of the corn fields where nut grass was a problem. The field application was made at a rate of 3 pounds of dinitro (1 gallon of Premerge or Simnox P.E.) per acre in 28 gallons of water at a pump pressure of 80 pounds per square inch.

This field application was even more effective than the applications to the test plots. The high pressure used evidently gave a better dispersion of the spray and a more effective coverage of the weeds. Excellent control of all weeds was secured with this post-emergence application of dinitro.

Further tests on the control of nut grass and other late season weeds are to be carried out in experiments at Point Pleasant and at Morgantown.

Irrigation--

Supplemental irrigation is increasing in West Virginia. It can improve yield and quality in forage crops.

Soil moisture can be quickly measured by reading the electrical resistance of gypsum blocks buried in the soil at each plot.

THE practice of supplemental irrigation of farm crops in the eastern United States has been expanding rapidly during the last few years. The U. S. Bureau of Census reports for 1949 to 1954 show that irrigated acreage in the 12 northeastern states increased from 87,000 to 190,000.

This development has focused attention on the problems associated with the use of irrigation. Answers to many of these problems are being sought through research projects at several of the agricultural experiment stations throughout the North east, under a cooperative agreement.

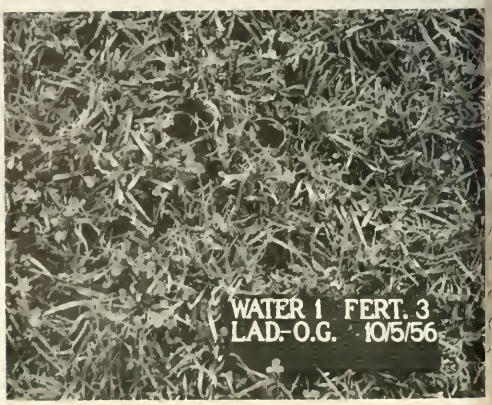
The experiments at the Reynolds Memorial Experimental Farms, which deal primarily with soil-plant-water relationships, are a part of this regional project. Experiment Station agronomists and agricultural engineers designed the experiment with these objectives: to establish the amount and timing of supplemental irrigation for optimum yields; to develop a simple on-the-farm method of determining when and how much to irrigate; to study the effects of fertility level on crops grown with supplemental irrigation; and to determine water requirements for irrigation based on the length and frequency of rainfall deficient periods.

Forage Crops Used

To date the project has been concerned with forage crops. The first work, initiated in 1953, was the irrigation of an old established pasture. Irrigation produced large increases in yields, but drought conditions reduced yields of the check plots to practically nil. Kentucky Bluegrass and Dutch White Clover, the desirable species, completely disappeared from the check plots in this case.

In the belief that mixtures other than blue grass-white clover might show better response to irrigation, alfalfa-bromegrass and Ladino clover-orchardgrass plots were seed

This plot was irrigated so as to maintain 50 per cent field capacity, whereas that on the right received no water other than rainfall. Note the difference in the Ladino clover populations. Additional moisture frequently helps to attain more favorable balances between desirable grasses and legumes.



ed in 1954. The alfalfa-bromegrass plots are harvested as hay, and the Ladino clover-orchardgrass plots are clipped to simulate grazing.

These plots, which are replicated, combine fertility and water treatments. When the mixtures were seeded in April 1954, a 10-10-10 fertilizer was applied to each of the plots at a rate of 250 lbs. per acre. In November, 5-10-10 fertilizer was applied to randomly selected plots at rates of 500, 1,000, 1,500, and 2,000 lbs. per acre. Applications of 10-10-10 at these same rates were made in the winters of 1955 and 1956.

Four Water Treatments

Four water treatments are used in the experiment. The first group of plots, used as controls, receive no water other than rainfall. Another group receives whatever water is necessary to maintain soil moisture levels at 50 per cent of field capacity during the growing season.

The third group of plots is irrigated every seven days. The water that is applied to these plots represents the difference between the rainfall and losses to evaporation during the preceding seven days. This amount is calculated from the water lost from the evaporating pan at the weather station at the Farms, assuming that this loss is approximately equal to evapo-transpiration from the plots. In those periods when the rainfall equals or exceeds the evaporation loss, no additional water is applied.

The fourth group of plots receive the same type of treatment at fourteen-day intervals.

Trials Not Complete

The yields of the two grass-legume mixtures show varied response to irrigation. Final conclusions as to this phase of the experiment must wait the completion of the project and a thorough analysis of the data. The project will continue through two or more additional growing seasons unless unfavorable conditions occur.

Water is pumped to the irrigation plots from a stream by a centrifugal pump powered by a water-cooled gasoline engine. The plots are located some 1,200 feet horizontally from, and 40 feet vertically above, the water supply. Distribution of the water to the plots is through a six inch main pipe, with a system of valves to control the flow of water to the sprinkler and perforated pipes on the plots.

Alfalfa-bromegrass plots (above) and Ladino clover-orchardgrass plots (below) receiving water during the experiment. The alfalfa-bromegrass mixture is receiving water from part-circle overhead sprinklers. Perforated pipe is supplying water to the Ladino clover-orchordgrass mixture.

The plots are divided so as to receive four different water treatments. One group receives only rainfall. Another receives whatever water is needed to maintain soil moisture at 50 per cent field capacity. The third group receives water every seventh day, in an amount calculated to equal the evaporation losses above rainfall during the preceding seven days. The fourth group receives a similar treatment at fourteen-day intervals.

The plots are also receiving various fertilizer treatments. The alfalfa-bromegrass mixture is being managed as hay, and the Ladino clover-orchardgrass mixture is being clipped to simulate grazing.

Bacteria on the Farm

MICROBE HELPERS IN THE SOIL

by Harold Wilson, Associate Bacteriologis

EVERY ounce of fertile soil is teeming with millions of microorganisms— microorganisms with such common names as bacteria, fungi, actinomycetes, algae, and protozoa. Were it not for these microbes, farmers and scientists, with all of their empirical and scientific knowledge and knowhow and modern equipment, would be unable to supply the food and fiber needed by man.

In the soil these microbes, like all living things, are struggling for existence. Their activities, as they live with one another in peace or in conflict, as they multiply, live and die, bring about changes in the soil. These changes are necessary for the growth of corn and cotton, grass and legumes, and all other plants.

Soil Microorganisms and Humus

Many plant and animal residues find their way into the soil and are attacked by certain of these soil microbes. Such microorganisms are termed *heterotrophic* microorganisms because they are dependent upon organic matter as a source of food and energy. Step by step these microorganisms decompose the plant and animal residues until, having lost all original characteristics, these residues become humus.

Humus, an indefinite compound, is ever-changing. Under good soil practices humus is always being formed, and at the same time disappearing, under microbial action. As it disappears, it leaves behind all its mineral elements, which in turn become available to nourish growing plants. This is a part of soil fertility maintenance.

Ammonia Formation

The formation of ammonia by bacteria, fungi, and actinomycetes during the decomposition of organic matter is termed *ammonification*. This ammonia is the nitrogen for which the microbes who are decomposing organic matter have no further use. It is not, however, a wasted product. It becomes the energy source for a group of bacterial specialists, the *nitrifiers*.

Some bacteria in the soil, termed *autotrophs*, obtain their carbon from the carbon dioxide in the air and their energy from the oxidation of such elements as sulfur and iron, or inorganic nitrogen compounds such as ammonia. Among such bacteria are those which convert ammonia to nitrates, a process called *nitrification*. As soon as ammonia begins to appear in the soil, certain special-purpose bacteria obtain their energy by converting this ammonia to nitrite. Under such conditions favorable to plant growth, this compound—which is toxic to plants—is quickly oxidized to nitrate-nitrogen, a form that can be used by most plants.

Nitrogen Fixation

It has been estimated that there are more than 100,000 tons of nitrogen in the atmosphere above each acre of land. Unfortunately, no plants, except legumes under certain conditions, have a pipe-line to this inexhaustible supply around and above them. If certain bacteria, called legume or nitrogen-fixing bacteria, have invaded the roots of leguminous plants and caused the formation of nodules on these roots, these plants are able to tap into this atmospheric nitrogen. On the other hand, if such bacteria are not present in the soil or in the roots, the legumes are entirely dependent upon the nitrogen already in the soil. This is the situation with corn, oats, wheat and all other nonlegumes.

There are two other groups of nitrogen-fixing bacteria that are less well-known, but nonetheless important. They, too, live in soils when conditions are right, and fix nitrogen without the cooperation of legumes.

This process of taking nitrogen from the air is called *nitrogen-fixation*. It is important to the continued fertility of the soils. Although it is not deemed practical to inoculate soils with the free-living nitrogen-fixers, it is practical and good management to inoculate legume seed with the proper legume bacteria. The legume bacteria will live for years under favorable conditions in the soil, but it is good cheap insurance to inoculate all legume seed when planting.

Algae and Protozoa

The activities of bacteria, fung and actinomycetes in the soil ha been more thoroughly studied th the activities of the soil algae a protozoa. Algae are widely dist buted in the soil. Those growi at the surface contain chloroph as do the higher plants of the pla kingdom, and add organic matt to the soil. One group, under c tain conditions, will fix atmosphe nitrogen. Algae living deeper in t soil do not form chlorophyll and a dependent upon the soil orga matter for their food and energy.

Protozoa belong to the anim kingdom. Their activities in the s are not well understood, but it s known that some feed upon b teria and some utilize organic m ter. As these small animals live a die they, too, add organic matte that always disappearing and alwa needed material—to the soil.

Nematodes, some beneficial a some harmful, also belong to t animal kingdom and are found the soil. Macroscopic forms of anim life such as earthworms, centipe millipedes, and other worms a insects which spend all or a porti of their life cycles in the soil a part of the ever-changing, ev active soil population.

The Silent Partners

Soil microbes, the silent partn of the farmer, do their work l and demand little in return. T are helped or hindered by soil c ditions, and much can be done enhance their activity. Temperat greatly influences microbial acti Whenever the temperature is fa able for plant growth, the mi organisms in the soil are act Since most microbes do better near neutral or sweet soils than t do in sour soils, all soils which too acidic should be limed.

Moisture is of prime importa to the soil microbes. The fungi actinomycetes are not so respon to low moisture conditions as b teria, but all need moist soil t of most value in helping main soil fertility. Drainage of wet s the use of proper rotations, ter ing, and planting on the cont

Crossbreeding may lead to better layers . . .

by T. B. Clork, R. S. Dunbar, and H. M. Hyre*

ROSSBREEDING may be the answer to better meat and egg production in poultry!

Three years ago an experiment as undertaken at this Station to udy this problem. Although some enefits of crossbreeding were nown before the present experi- ent, we were uncertain of some the results of previous experi- ents.

For example, which way should me of the crosses be made to ob- in the best results? One answer this question is that if we would e White Leghorn females when ossing White Leghorns with New ampshires, we would obtain bet- r egg production than if we were use New Hampshire females in reciprocal cross.

The results of this experiment for e past two years have been similar, d those reported in Table 1 for e 1955-56 laying year are typical.

ttle Difference Between Crosses

The results show there is but tle difference in the egg produc- n of the F_1 pullets from the recip- cal crosses. This means that we n use the desired cross of New mpshire cockerels on White Leg- rn pullets and expect just as good g production from the offspring this cross as when the cross is de the other way.

There was only a small difference the laying pen mortality between e two crosses. Both had a lower rtality than the New Hampshire ents. The results from other ex- riment stations suggest that the west mortality can be expected en the Leghorn pullet is used as e parent.

The most interesting part of these sults to the egg producer is that e F_1 crossbred pullets produced an average of 194 eggs per bird over the ten-month period—12 per cent more than the 173 eggs per bird laid by the White Leghorn parent flock, and considerably more than were laid by the New Hampshire parents. This increased egg production can be considered to be the result of hybrid vigor.

Egg Color Is Uniform

Egg size and shell quality were about midway between that of the two breeds. Likewise, the egg shell was about midway in color between the New Hampshire brown shelled eggs and the White Leghorn eggs. In fact, the color is more uniform than the egg color of the New Hampshire parent, which ranges from dark brown to light cream.

This egg shell color is pleasing and is not discriminated against on the local market. The eggs are easy to clean because they do not show stains as readily as White Leghorn eggs.

In an effort to reduce the cost of broiler production, we planned to try to use this high producing F_1 crossbred pullet. It was hoped that further crossing with this pullet, as in a 3-way cross, would take additional advantage of hybrid vigor.

Crossbred Males Used

Crossbred males, in which growth rate had been stressed, were crossed with these pullets and the offspring were studied to determine growth rate and feed efficiency. The results have been encouraging and will be published in a later report. One bad effect, from the standpoint of the egg producer, is that this practice may increase broodiness. However, broodiness has not been too severe in our trials.

The F_1 offspring are partly red in color and resemble the Leghorn in shape. Because of this the cockerels do not have much value for meat purposes. The best answer to this problem is sexing at hatching time so as to get rid of the cockerels at once.

A bad feature of any crossbreeding is that one cannot predict whether all strains will give beneficial results, such as were obtained here. Strains must first be tested to determine if they show this hybrid vigor when crossed.

These crossbred pullets are being used on several local farms. They have been giving the same good account of themselves as they did at the West Virginia University Poultry Farm.

TABLE 1. PERCENTAGE MORTALITY AND EGG PRODUCTION OF PUREBREDS AND RECIPROCAL CROSSES (ABOUT 10 MONTHS).

PARENTS	NUMBER STARTED	DIED (*Per Cent*)	PRODUCTION (*Per Cent*)
New Hampshires	405	16.05	53.80[1]
White Leghorns	459	8.06	57.83
F_1—New Hampshire (males) x White Leghorn (females)	135	11.85	64.02
F_1 White Leghorn (males) x New Hampshire (females)	139	15.11	65.83

[1]This means that these birds laid on 53.80 per cent of the days during the study

*Respectively, Associate Poultry Husbandman; Statistician; and Associate Poultry Husbandman.

MICROBES

some practices which can be used ere needed and will in turn make . conditions more favorable for se silent soil partners.

Unfortunately, the soil is also the iding place for some harmful bacteria, fungi, and actinomycetes that cause plant diseases. Yet, if the soil is maintained in a condition favorable for the activities of the beneficial soil microorganisms, they will keep some of the harmful microbes under control.

Editor's Note: "Microbe Helpers in The Soil" is the third of four articles explaining the role of bacteria on the farm. The fourth, to appear soon in *Science Serves Your Farm*, will deal with bacteria in water and sewage.

WILDLIFE PLANTINGS

(continued from page 3)

even during the snows and ice storms of March and early April. Obviously, no one situation is likely to contain all of these species in proper balance, but those present should be protected while necessary additions are being made.

Cover May Be Critical

In many parts of West Virginia winter cover is likely to be in more critical shortage for game than winter food. Such evergreen shrubs as rhododendron and mountain laurel furnish good cover, but little in the way of food. Low-growing conifers, such as common juniper, make excellent cover and offer some food. The trouble is, however, that West Virginia is naturally a state of deciduous trees and shrubs. Conifers and broad-leaved evergreens are locally distributed, and may be completely absent over wide areas.

The landowner seeking to encourage wildlife through plantings should make an effort to determine what the food and cover situation is on his area, what the major needs are, and what plants will best supply these needs of wildlife. In most cases, expert assistance from biologists of the West Virginia Conservation Commission or the Soil Conservation Service is available.

Many Useful Species

The most useful introduced plant on West Virginia farms, so far as wildlife is concerned, is likely to be multiflora rose. Used extensively in living fences and hedges, this Asiatic rose makes excellent wildlife cover throughout the year, and its fruit capsules are an emergency, if not a preferred, source of food. Rose fences make excellent game lanes, natural travel courses between varying wildlife habitats. They offer nesting sites to many birds, and afford escape cover to bobwhites, cottontails, and other farm game animals. This rose is the best example of a multiple-purpose plant.

Another introduced shrub, especially valuable for bobwhites, is bicolor lespedeza. Since it is a legume, the seeds of this low shrub are rich in proteins much needed by wintering wildlife. Bicolor lespedeza forms dense stands at field and woodland borders. It takes some years to reach its best period of seedbearing, but it is an abundant producer when mature.

Autumn Olive Resists Drought

Autumn olive, a low tree from Asia, is at home in sandy soils of low-moisture content. It resists drought, and produces large crops of small fruits which are available to wildlife in fall and early winter. Those falling to the ground are utilized fully, so that food-values of this plant may extend into the winter. Autumn olive likes full sun, so it should not be planted too close to woodland.

An attractive shrub or small tree is Tartarian honeysuckle (the first name is often spelled "Tatarian"), a plant which produces pink flowers in spring and heavy crops of bright red fruits in mid-summer. These fruits are eaten by a wide variety of birds and mammals. They come at a time when many animals have young to feed, so they are particularly valuable. The fruits do not persist on the trees, however, so this plant is of little value as a source of winter food for wildlife.

Silky dogwood is a native species which grows in dense thickets, thus making good wildlife cover. It bears heads of small yellowish-white flowers, which are followed by dense clusters of blue fruits. The fruits are eaten by bobwhites, grouse, and many songbirds. This dogwood tolerates a great variety of soils, does well in sun or partial shade, and reaches heights of 8 to 10 feet.

Ornamentals Useful

Around rural or suburban homes, many persons like to plant ornamentals which will give beauty throughout the year, and which will attract birds and other wildlife. Since specimen plants will be used, and since these will likely be given extra care and attention, a much wider variety of planting material is available. With some planning, food and cover can be afforded wildlife at every season.

Traditionally, many home plantings have made extensive use of arbor vitae, low pines, junipers, yews, and other evergreen conifers. These afford a certain amount of cover, but very little food to wildlife. A planting trend of recent years is to make use of evergreen hollies, which are very attractive, and have great winter wildlife value.

The native American holly is on of the best plants for this purpos although it grows to tree-size, an does not properly come under di cussion here.

Japanese holly has many hort cultural varieties, some of whic are hardy at most elevations i West Virginia. It makes a very a tractive shrub or small tree. . lower elevations in the State, son varieties of the showy English hol may be hardy, although these shou be planted on an experimental bas Since all hollies bear male flowe on one plant and female flowe on another, trees of both sexes mu be present if berry crops are to b produced.

Chestnuts Popular

There has been much intere locally, in Chinese and other Asiat chestnuts as partial replacemen of the blight-killed American che nut. These Asiatic chestnuts a generally blight-resistant, and so strains withstand low temperatu which occur in the State. Howev most of them will be shrubby rath than tree-like. They produce crops f nuts, but, like American chestnu these vary greatly from tree to tr Some are excellent, while others a of poor quality.

Planting of Asiatic chestnu should be on a purely experimen basis. In many cases survival not good. When the plants li their growth may be very slow. A fertilizer containing nitrogen is li ly to stimulate excessive growth the plants, and this new growth n winter-kill, or die of blight in following season. Such fruits as produced by Asiatic chestnuts quite likely to be wormy, beca of infestations of chestnut weev In no sense is this plant a repl ment for American chestnut; at b it is an interesting, and sometim valuable, new plant introduction

Winter Food For Song Birds

As a winter food for songbi the fruits of Oriental crabapples excellent. These plants (sold un the scientific name of *Malus fl bunda* or *Malus floribunda a purpurea*) are particularly ha some ornamentals. The small fr cling to the twigs well into win and are eaten by most species birds. Cardinals have a partic preference for them. Since th small trees are apples, they are ject to attack by borers, scales, some fungus enemies of commer apple trees. They will need t same care that the Transparento

ummer Rambo tree in the yard re-
ives.

Most native, and many intro-
uced, viburnums are valuable orna-
ientals, both for beauty of flower
nd foliage, and for wildlife. These
lants (which include black haw,
igh-bush cranberry, wild raisin,
nd many others) bear fruits that
ersist into late fall and winter.
ome introduced species with at-
active flowers are practically
erile, but this is not true of native
ecies.

Other ornamentals of great value to wildlife would include flowering dogwood, mountain ash (both the American and European species), climbing bittersweet, evergreen bittersweet, and many more. They challenge the home planter, if he wishes to welcome game animals and songbirds throughout the year.

Many West Virginia University Agricultural Experiment Station publications may be obtained at County Agricultural Extension Service Offices throughout the State.

NEW PUBLICATIONS

(continued from page 2)

398. E. A. Livesay, C. J. Cunningham. Native Hampshire Type Ewes vs Western Corriedale Type Ewes for (a) Lamb and Wool Production (b) Longevity. April 1957.

399. G. C. Anderson, B. N. Day, W. R. Lewis. The Value of Inedible Animal Fats in Pig Rations. April 1957.

400T. Norman Nybroten. Behavior and Opinion Studies of Homemaker's Preferences for Hen Eggs. May 1957.

401. Leonard Sizer. Population Changes in West Virginia, 1900-1955. May 1957.

402. T. C. McIlvaine, G. G. Pohlman, D. R. Browning. Fertilizer Experiments with Tobacco. May 1957.

Currants

Another berry crop for the local market

by W. H. Childs, Horticulturist

HE red currant is not commercial-
ly important in West Virginia.
Only one commercial acre was
ted in the 1950 census. However,
ny people grow currants for home
e, and there is a good local market
r a moderate amount of the fruit.
though West Virginia can never
ect to be a leader in commercial
rant production, several acres
uld be grown with profit.

ew Varieties

A large number of varieties have
en introduced during the past
ifty years, with considerable con-
sion as to which were and which
re not desirable varieties. By the
rly 1930's, most authorities were
ommending the Perfection or the
ilder varieties for the northeastern
rt of the United States. The for-
er was the most attractive in ap-
arance, but was not as high yield-
g or as satisfactory for jelly mak-
g.

By the latter part of that decade,
e Red Lake variety, introduced by
e Minnesota Agricultural Experi-
nt Station about 1920, was be-
ming popular. Since there was
experimental comparison of these
ree varieties under West Virginia
nditions, a small test plot was
t out at Morgantown in 1941.

arieties Tested

On April 3, 1941, thirty plants—
each of the three varieties—were
in a systematic arrangement on
wly-cleared ground. The planting
stance was 5' x 5', each plant
ting next to one of each of the
her two varieties. The clay loam
il was fertilized with 300 pounds
superphosphate and 100 pounds of muriate of potash per acre before disking. The plants were side-dressed with sodium nitrate about 3 weeks after they were set, and in early April of each year, were fertilized with sodium nitrate or its equivalent at the rate of 300 pounds per acre. The site was on a northeastern slope, and the planting was kept continuously mulched after mid-June, 1941, to keep the soil as cool as practical.

Individual plant yields were recorded in ounces from 1942 to 1951 inclusive, and then converted to quarts per acre for comparison. Table 1 gives the average yields for each of the ten years, and the ten-year average. In 1943 fruit set was poor and bird injury severe, so yields were low. Serious frost injury reduced yields in 1945.

Red Lake or Wilder

Red Lake started out considerably the best of the three varieties, yielding highest for the first six years. It was not able to retain this advantage, however, and Wilder surpassed it in yield in three of the last four harvests, and ended up with a better average for the 10-year period. Perfection also outyielded Red Lake in the last two years, but was considerably behind for the entire period. Two Red Lake plants died before the end of the ten-year period (they were not counted in computing averages), but no other plants were lost.

Perfection was the most attractive variety and the poorest in quality. There was not much from which to choose in appearance or quality of the other two varieties. For the one year that such data were noted, Red Lake produced the largest clusters, Perfection the next-largest, and Wilder the smallest. This may not have been the case over the entire period.

If these results can be applied to West Virginia in general, it appears that Red Lake may be superior for those plantings that are to be replaced after 8 to 10 years, but Wilder would be preferred for small home plantings that may be left indefinitely.

TABLE 1. AVERAGE YIELDS IN QUARTS PER ACRE OF TEN PLANTS OF EACH OF THREE CURRANT VARIETIES, 1942-51

	VARIETY		
	PERFECTION	RED LAKE	WILDER
1942	658	1524	830
1943	188	1757	318
1944	2735	5013	1825
1945	166	662	139
1946	2243	4834	1115
1947	1619	4297	3651
1948	1351	5863	7168
1949	4703	5705	5383
1950	4965	4529	7020
1951	1834	4458	6139
AVERAGE	2646	3864	4004

WVU Dairy Herds

are Champion Producers!

by I. D. Porterfield

Dairy Husbandmon

Holsteins

Ayrshires

Jerseys

It is with pride that we can report that t three University dairy herds have again w the Constructive Breeders' Award and t Progressive Breeders' Award. These awar are presented to purebred herds meeting hig production, type, and health standards.

Holstein Herd—The twenty-five cows this herd produced during the past year (19 an average of 14,769 lbs. of milk testing per cent and 585 lbs. of butterfat. They h an average type score of 84.0. The herd qua fied for its ninth consecutive Progressi Breeders' Award. This herd has an avera production of 13,151 lbs. of milk and 533 l of butterfat over the last five years.

Jersey Herd—The ten cows in this herd p duced more milk and butterfat than in a year since they were put on the twice-a-d milking schedule. They produced 9,007 lbs. milk and 170 lbs. of butterfat. The avera butterfat test was 5.2 per cent, and the ty score averaged 86.8, thus earning the herd ninth Constructive Breeders' Award. H average over the past five years has be 7,987 lbs. of milk and 133 lbs. of butterfat.

Ayrshire Herd—The twenty-seven cows the Reymann Memorial Ayshire herd p duced during the past year (1955) an aver of 10,927 lbs. of 4.1 per cent milk and lbs. of butterfat. Since many of the anim were first-call heifers, the records were c verted to a mature basis. When this done they equaled 11,711 lbs. of milk a 178 lbs. of butterfat. There are only se other herds of the Ayrshire breed which h won as many Constructive Breeders' Awa as has the Reymann herd, with twelve s awards. The average classification of herd is 85.7. The mature equilavent five-y average for the Reymann herd is 10,899 of milk and 158 lbs. of butterfat.

Many of the cows in the University h are daughters of bulls used by the West V ginia Artificial Breeders' Cooperative.